

REMARKS

In the foregoing amendment, claims 10 and 12 are canceled, claim 11 is amended, and new claim 19 is added. Now, claims 1, 5, 7, 8, 11 and 16-19 are pending in the application, of which claims 1, 5, 11 and 16 are independent. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance.

Patentable Subject Matter

Claim 1, 5, 7, 8, 17 and 18 are indicated to recite patentable subject matter. Applicants appreciate the Examiner's passing the claims to allowance.

Claim Amendments

Applicants amend claim 11 and add new claim 19 to clarify the scope of the claimed invention. In particular, claim 11 is amended in independent form to incorporate the subject matter recited in claim 12, which is now canceled. Claim 11 is further amended to recite that the first and second imaging multimode interference devices are adapted to substantially remove all modes but a fundamental mode of an optical signal received by the devices. Support for the claim amendments can be found in Fig. 4 and corresponding descriptions in the Specification. No new matter is added.

Claim Rejections - 35 U.S.C. §102

Claims 10 and 12 are rejected under 35 U.S.C. §102(b) as being anticipated by an article entitled 'Active multi-mode-interferometer semiconductor optical amplifier' ('Hamamoto'). In the foregoing claim amendments, Applicants cancel claims 10 and 12, and hence submit that the rejection of claims 10 and 12 moot under 35 U.S.C. §102(b). Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of claims 10 and 12 under 35 U.S.C. §102(b).

Claim Rejections - 35 U.S.C. §102

Claim 16 is rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,111,998 (“Ido”). Applicants respectfully traverse this rejection for the following reasons.

Claim 16 recites *an optical attenuator* having an input waveguide and an imaging multimode interference device adapted to substantially remove all modes but a fundamental mode of an optical signal received from the input waveguide. The optical attenuator includes *an electrode adapted to apply a bias voltage to the surface of the imaging multimode interference device*.

Applicants respectfully submit that Ido fails to disclose each and every element of claim 16. Applicants submit that Ido fails to disclose *an optical attenuator*, as recited in claim 16. The Examiner notes in the Office Action that Fig. 7 of the Ido reference teaches the optical attenuator recited in claim 16. Applicants respectfully disagree with the Examiner’s position. Claim 16 is directed to an optical attenuator. The Ido reference, however, discloses in Fig. 7 and corresponding descriptions *a laser* rather than an optical attenuator. Ido does not disclose an optical attenuator, as recited in the claimed invention.

Additionally, Applicants submit that Ido fails to disclose an electrode adapted to apply a bias voltage to the surface of the imaging multimode interference device, as recited in claim 16. Ido discloses the top electrode (21) *above* the MMI mode filter device (2). Ido discloses the use of a window in the electrode *above* the MMI mode filter. Ido, however, does not disclose the use of the electrode *on* the MMI mode filter. Furthermore, the Ido reference discloses in Fig. 7C that the insulating SiO₂ layer (20) is continuous across the surface of the MMI mode filter to prevent the application of a bias voltage to the surface of the MMI mode filter. The laser disclosed in the Ido reference does not include an electrode adapted to apply a bias voltage to the mode filter because the top electrode (21) includes a window *above* the mode filter (2).

In light of the foregoing arguments, Applicants respectfully submit that Ido fails to disclose each and every element of claim 16. Applicants therefore request the Examiner

reconsider and withdraw the rejection of claim 16 under 35 U.S.C. §102(b) and pass the claim to allowance.

Claim Rejections - 35 U.S.C. §103

Claims 11 is rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2003/0113063 ("Liu") in view of the Hamamoto reference. Applicants respectfully traverse this rejection for the following reasons.

In the foregoing claim amendments, Applicants amend claim 11 in independent form to incorporate the subject matter recited in claim 12, which is now canceled. Claim 11 is further amended to recite that *the first and second imaging multimode interference devices are adapted to substantially remove all modes but a fundamental mode of the optical signal received by the devices.*

Applicants respectfully submit that the cited prior art references fail to teach or suggest all of the limitations of claim 1. Applicants submit that Liu and Hamamoto fail to teach or suggest that the first and second imaging multimode interference devices are adapted to substantially remove all modes but a fundamental mode of the optical signal received by the devices, as recited in claim 11. This limitation of claim 11 clarifies that the multimode interference device of the claimed invention has a mode-stripping nature. Applicants submit that the mode-stripping nature of the claimed invention is not taught in the cited references.

Liu teaches the expanding and splitting functions of the MMI coupler (201) that divide the optical signals between waveguides (202). The MMI coupler of the Liu reference performs this function by exploiting higher order modes in order to split the signal between the waveguides. The Liu reference does not teach the mode-stripping nature of the MMI device, as recite in the claimed invention.

Hamamoto teaches the use of a semiconductor optical amplifier (SOA) having an multi-mode-interferometer (MMI) device. Fig. 1a of the Hamamoto reference teaches an active MMI-SOA consisting of a regular single mode waveguide with a 1x1 MMI coupler. The Hamamoto teaches the use of MMI as a part of the SOA in order to increase the active

area of the SOA. (See, Hamamoto, page 1219, right column, second paragraph). The Hamamoto reference does not teach the mode-stripping nature of the MMI device, as recite in the claimed invention.

In light of the foregoing claim amendments and arguments, Applicants respectfully submit that Liu and Hamamoto fail to teach or suggest all of the limitations of claim 11. Applicants therefore request the Examiner reconsider and withdraw the rejection of claim 11 under 35 U.S.C. §103(a) and pass the claim to allowance.

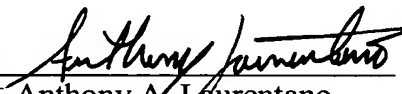
New Claim

New claim 19 is added to depend upon claim 11. Applicants submit that new claim 19 is not rendered obvious over the cited prior art referenced and request the Examiner to pass new claim 19 to allowance.

CONCLUSION

In light of the aforementioned amendments and arguments, Applicants contend that each of the Examiners rejections has been adequately addressed and the pending application is in condition for allowance. Should the Examiner feel that a telephone conference with Applicants' attorney would expedite prosecution of this application, the Examiner is urged to contact the Applicants' attorney at (617) 227-7400.

Respectfully submitted,

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